SECTION 3.4

Evaluation and Selection of Alternatives

This section summarizes the evaluation and selection of remedial alternatives presented in the FFS (CH2M HILL, 2003a) for each coastal salt marsh site. The following remedial alternatives were developed in the FFS by assembling remedial technologies compatible with wetland functions into treatment options that meet RAOs:

- Alternative 1, No Further Action
- Alternative 2, Excavation and Offsite Disposal

Some alternatives, such as capping and in situ soil stabilization/solidification were considered but then eliminated from further evaluation because they are not compatible with wetlands functions. Excavation with onsite disposal was also considered, but is not compatible with wetlands functions.

The sections below describe the remedial alternatives, and their selection for each site. The rationale for adopting the selected alternative is also provided.

3.4.1 Remedial Alternatives

The two remedial alternatives evaluated in detail in the FFS were No Further Action, and Excavation and Offsite Disposal. These alternatives are described below.

3.4.1.1 Alternative 1, No Further Action

In accordance with the NCP (40 CFR 300), CERCLA guidance (EPA, 1988a), and under Chapter 6.8 of Division 20 of the California Health and Safety Code, a No Further Action alternative was developed for evaluation at each site. Under this alternative, no further action would be taken and there would be no restrictions placed on the use of the site.

The No Further Action alternative reflects leaving a site in its current condition. In the analysis presented below, it is intended that this option be included only as a comparison to other alternatives. This alternative will not be selected for any of the sites requiring remedial action, because it would not meet RAOs.

3.4.1.2 Alternative 2, Excavation and Offsite Disposal

Under this alternative, contaminated soils above action goals will be excavated and disposed of at an appropriate offsite landfill facility. Table 3.2-1 (at the end of Section 3.2) lists the action goals for sites that have been determined to require excavation. Excavation at the coastal salt marsh sites will continue until the action goals have been achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown not to pose an unacceptable risk to human health and the environment.

Activities in the coastal salt marsh will be conducted in a manner that is sensitive to impacts on plants and animals. Except in the area proposed as a channel cut by the HWRP, the

excavated areas in the coastal salt marsh will be backfilled with clean onsite soil or re-handled dredged material of similar physical characteristics.

Institutional controls in the form of land use restrictions will be required where contamination remains above action goals. These institutional controls include:

- Grading, excavation, and intrusive activities must be conducted pursuant to a plan approved by the State.
- The property shall not be used for residences, schools, daycare facilities, hospitals, hospices, or other similar sensitive uses.

State and federal agencies must have access to the property. The property owner shall provide access, on an as-needed basis, minimizing any interference with the implementation, operation, or maintenance of the ecosystem restoration project. Appropriate federal and state agencies and their officers, agents, employees, contractors, and subcontractors will have the right, upon reasonable notice, to enter the property where it is necessary to carry out response actions or other activities consistent with the purposes of this ROD/RAP. Appropriate federal and state agencies and their officers, agents, employees, contractors, and subcontractors will also have the right, upon reasonable notice, to enter adjoining property where it is necessary to carry out response actions or other activities consistent with the purposes of this ROD/RAP.

Remedial Goals

Alternative 2 serves three purposes:

- To prevent human or ecological contact with contaminated soil/sediment
- To prevent migration of contamination
- To minimize long-term impact to habitat

Primary Action

Implementation of this alternative would consist of excavation and offsite disposal of site soils, as well as sampling to confirm removal of contaminated soils from the affected site. Sites that are not channel areas would be backfilled to grade with clean soil. The following paragraphs describe the primary activities and general design considerations for Alternative 2.

Equipment mobilization and establishment of staging areas and access to the sites targeted for remedial action. Staging areas would be established on the airfield inboard property for heavy equipment, decontamination, and soil transfer from offroad trucks to highway transport trucks. Some sites can be reached on existing roadways in the coastal salt marsh or directly from the levee. For areas that are not accessible by existing roadways, temporary roads will be constructed. Low-impact methods will be used when practicable. The temporary roadway material will be removed as equipment is demobilized from each site.

Preconstruction biological surveying. Preconstruction surveying and trapping may be necessary to ensure that no sensitive species are present on the excavation sites. Sensitive species are discussed in Section 1.4.5. Noise, vibration, visual-related, and proximity-related disturbances associated with project construction could adversely affect sensitive species. Mitigation measures may include erecting barrier exclusion fencing to impede salt marsh harvest mice from entering the construction area, avoiding construction during the breeding

period for the clapper rail (February 1 through August 31), and placing fish barriers at waterways that are connected to excavation sites. Additional mitigation measures may be identified during remedial design.

Excavation of site material. Contaminated material would be excavated using standard construction equipment. Equipment will be chosen that exhibits low impact to habitat and high efficiency. Where possible, excavation activities will be conducted within the excavation areas to avoid temporary construction of access roads. Excavation will continue until the action goals are achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown to not pose an unacceptable risk to human health and the environment. Excavation in saturated conditions may result in the production of excess water in the excavation site through seepage of groundwater. This water would be disposed of properly.

Storage and disposal of site material. Excavated materials would need to be classified, stored onsite, and disposed of in a suitable offsite location. Waste profiling would be required to determine classification of the waste. Soil blending may be required to reduce moisture content of the excavated materials. Soil would be classified for disposal before blending. Soil would then be disposed of in an approved landfill, based on waste classification.

Confirmation sampling. Confirmation samples would be collected to verify that action goals are met. These samples could be collected as predesign investigation samples that would be collected before excavation to determine the extent of the excavation geometry. Alternatively, confirmation samples could be collected following excavation activities. Once the confirmation sampling shows that all remaining contaminant concentrations have been reduced below action goals, the site can be backfilled.

Backfill operations. Except in the area proposed as a channel cut by the HWRP, the excavated areas in the coastal salt marsh will be backfilled with clean onsite soil or re-handled dredge material of similar physical characteristics. For sites in the high marsh environment, backfilled excavations will be contoured to eliminate topographic depressions and promote the reestablishment of native vegetation. The site is expected to revegetate naturally, and seeding or planting is not anticipated.

Postconstruction monitoring. Postconstruction observations will include physical observations to check for reestablishment of the vegetation on the site, if applicable. Monitoring to address contaminants will be required where appropriate.

3.4.2 Evaluation of Alternatives

The remedial alternatives were evaluated based on the nine criteria set forth in the NCP. These evaluation criteria served as the basis for conducting the detailed analysis during the FFS and for selecting via this ROD/RAP a remedial action appropriate for the coastal salt marsh. Refer to Section 4.0 of the FFS (CH2M HILL, 2003a) for an in-depth review of all criteria.

The first two criteria, overall protection of human health and the environment and compliance with ARARs, are threshold criteria. Alternatives that do not meet the threshold criteria are eliminated from further evaluation. The remedy selection is based primarily on the next five criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability
- Cost

The remaining criteria, State (support agency) acceptance and community acceptance, will be evaluated following receipt of comments on this ROD/RAP.

The list below analyzes the alternatives against the nine criteria. Alternative 1 is carried forward only as a comparison to other alternatives. This alternative will not be selected for any of the sites requiring remedial action because it would not meet RAOs.

1. **Overall Protection of Human Health and the Environment**
   Alternative 1, which involves no additional remedial activity to protect human health or the environment, does not meet this objective. Alternative 2 protects human health and the environment by removing the contamination at each site until the action goals are achieved, or until it is determined by joint agreement of the State and Army that further excavation is impractical, or until the point at which the State and the Army agree that the remaining contamination is shown not to pose an unacceptable risk to human health and the environment.

2. **Compliance with Applicable Requirements**
   Alternative 2 is expected to satisfy these criteria because it will meet the location and action-specific ARARs. A description of how Alternative 2 meets the ARARs is contained in the FFS. While there are no chemical-specific ARARs for residual contamination at HAAF, chemical-specific TBC criteria are proposed for the site. Alternative 2 will meet the criteria by removing contamination above action goals. Alternative 1 does not meet these criteria.

3. **Long-Term Effectiveness and Permanence**
   Alternative 2 provides a high degree of long-term effectiveness because the contamination will be removed from the site, or if contamination is left in place, exposure of receptors to remaining contaminants will be prevented. Alternative 1 is not effective in the long term.

4. **Reduction of Toxicity, Mobility, and Volume through Treatment**
   None of the alternatives involve treatment to reduce toxicity, mobility, or volume of contaminants. Soils at HAAF have a high clay content, and treatment options for contaminated soil with a high clay content are not practical.

5. **Short-Term Effectiveness**
   Alternative 2 has the potential for short-term impacts on the community, workers, and environment because it involves excavation in a sensitive habitat, stockpiling, blending of soils to reduce water content, if necessary, and transportation to an offsite disposal facility. Fugitive dusts can be created during this process, but will be controlled using

water, as necessary. Risk of worker exposure can be mitigated by following safety protocols during excavation activities. No short-term impacts are expected from Alternative 1.

6. **Implementability**
   There are no obstacles associated with implementing Alternative 1. Alternative 2 includes a few obstacles because this alternative uses excavation to reduce contamination. Excavation activities can be difficult because the stability of excavation areas and impact to habitat for access must be considered. However, excavation is a well-established remedial action and activities can be completed safely.

7. **Cost**
   Estimated project costs for Alternative 2 are listed in Table 3.4-1 (included at the end of this section). There are no costs for Alternative 1. The cost analysis includes estimated expenditures required to complete the remediation in terms of both capital costs and annual operations and maintenance. Cost estimates are based on estimated excavation volumes and monitoring and are expressed in terms of 2003 dollars.

8. **State (Support Agency) Acceptance**
   RWQCB and DTSC hereby determine, based on the substantial evidence in the administrative record, that this ROD/RAP has been properly noticed, circulated for public review and comment, and approved in accordance with the requirements of Sections 25356.1 and 25356.1.5 of the Health and Safety Code Chapter 6.8 of Division 20, the Porter Cologne Water Quality Control Act, and all other applicable State laws.

9. **Community Acceptance**
   Community acceptance refers to the public's general response to the alternatives described in the draft ROD/RAP. The community will have the opportunity to comment in writing on the ROD/RAP during a 45-day comment period. There will also be an opportunity for the public to ask questions and make comments at a meeting to be held during the 45-day comment period.

3.4.3 Comparative Analysis of Selected Alternatives

This section summarizes the basis for the selected alternative for each coastal salt marsh site. For each site, the selected alternative satisfies the statutory requirements of CERCLA Sections 121 and 120(a)(4), as amended by SARA, and California Health and Safety Code Section 25356.1.5, which requires response actions approved by RWQCB and/or DTSC under Chapter 6.8 of Division 20 of the California Health and Safety Code, in that the following mandates are attained:

- The selected remedy is protective of human health and environment.
- The selected remedy complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action.
- The selected remedy is cost-effective.

A number of the coastal salt marsh sites are adjacent to each other, or are in proximity (see Figure 3.4-1, included following the tables at the end of this section). Given the proximity of

sites, there is overlap in some of the excavation boundaries proposed in the alternatives selected below. The total volume of soil to be excavated at the coastal salt marsh sites, along with the total area of excavations, is presented in Section 3.4.5. In addition, Section 3.4.5 provides an estimate of the total area of pickleweed habitat that may be affected as a result of carrying out the selected alternatives for the coastal salt marsh sites.

3.4.3.1 Antenna Debris Disposal Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Antenna Debris Disposal Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Antenna Debris Disposal Area are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Antenna Debris Disposal Area.

Minimum, Maximum, and Average Values for FFS COPCs — Antenna Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	28	28.7	1,370	176	188
Beryllium	28	0.4	4.3	2.2	1.68
Cadmium	25	0.34	6.9	2.30	1.8
Cobalt	28	7	322	58	26.7
Copper	28	28.3	726	130	88.7
Lead	29	14.1	2,100	330	46.7
Manganese	29	227	7,440	1,931	1,260
Nickel	29	43.5	396	182	132
Silver	29	0.047	2.2	0.82	1
Zinc	29	70.4	2,930	169	169
Diesel Range Hydrocarbons	29	370	370	370	144
Endrin aldehyde	20	0.0015	0.02	0.0076	0.0064
Heptachlor	20	0.062	0.062	0.062	0.0088
Heptachlor epoxide	20	0.1	0.1	0.100	0.0088
MCPA	7	71	71	71	7.9
MCPP	6	27	27	27	3.0
Motor Oil	2	2,900	2,900	2,900	144
PCBs Total	21	0.00007868	2.19	0.38	0.09

Minimum, Maximum, and Average Values for FFS COPCs — Antenna Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
DDTs Total	28	0.0019	6.39	0.92	0.03
BHCs Total	27	0.003	0.61	0.166	0.0048
Chlordanes Total	27	0.0026	1	0.17	0.00479

Units are in ppm.
MCPA = methyl chlorophenoxy acetic acid
MCPP = mecoprop

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.2 East Levee Construction Debris Disposal Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the ELCDDA. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the ELCDDA are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the ELCDDA.

Minimum, Maximum, and Average Values for FFS COPCs — East Levee Construction Debris Disposal Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	57	5	1,280	79	46.7
Zinc	52	18.8	855	154	169
Diesel Range Hydrocarbons	19	149	723	390	144
Total Dioxin Equivalents	4	0.087E-05	0.015E-05	0.006E-05	2.1E-05
PCBs Total	19	0.048	0.35	0.16	0.09
DDTs Total	9	0.0057	0.094	0.036	0.03

Units are in ppm.

Alternative 1, No Further Action, was not selected because the alternative would not meet RAOs.

3.4.3.3 High Marsh Area

Nonchannel Cut Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Nonchannel Cut Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Nonchannel Cut Area are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Nonchannel Cut Area.

Minimum, Maximum, and Average Values for FFS COPCs — High Marsh Nonchannel Cut

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	93	0.37	8.6	2.43	1.68
Cobalt	95	5.3	162	43	26.7
Copper	95	21.5	1,600	118	88.7
Lead	95	12.9	1,540	169	46.7
Manganese	93	152	12,200	1,616	1,260
Nickel	95	18	800	181	132
Silver	95	0.03	6.61	1.20	1
Zinc	95	57.3	1,160	205	169
Endrin aldehyde	7	0.0034	0.016	0.010	0.0064
PCBs Total	10	0.008768	0.507021	0.10	0.09
DDTs Total	29	0.0024	5.64	1.38	0.03
Chlordanes Total	22	0.0042	1.3	0.24	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

Proposed Channel Cut

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Proposed Channel Cut. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the

Proposed Channel Cut are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Proposed Channel Cut.

Minimum, Maximum, and Average Values for FFS COPCs – High Marsh Channel Cut

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	49	0.9	7	2.11	1.68
Cadmium	49	1	3.8	2.04	1.8
Cobalt	49	16.1	115	37	26.7
Lead	49	7	796	160	46.7
Nickel	49	77.2	376	133	132
Endrin aldehyde	39	0.0028	0.097	0.053	0.0064
Motor Oil	39	11	1100	89	144
DDTs Total	39	0.0022	9.9	0.77	0.03
Chlordanes Total	39	0.0022	0.41	0.149	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.4 Historic Outfall Drainage Ditch

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Historic ODD. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Historic ODD are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Historic ODD.

Minimum, Maximum, and Average Values for FFS COPCs — Historic ODD

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cadmium	19	3.3	11.5	7.23	1.8
Cobalt	19	11.5	136	31	26.7
Lead	19	16.2	229	45	46.7
Manganese	19	534	18,200	2,034	1,260
Nickel	19	68.7	546	133	132
Zinc	19	76.5	647	156	169
Dichlorprop	3	1.7	1.7	1.70	0.14

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.5 Outfall Drainage Ditch

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the ODD. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the ODD are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the ODD.

Minimum, Maximum, and Average Values for FFS COPCs — Outfall Drainage Ditch

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Beryllium	39	0.53	6.8	2.14	1.68
Cadmium	43	1.1	18.6	5.52	1.8
Cobalt	43	13.8	199	41	26.7
Lead	43	9.7	752	133	46.7
Manganese	39	280	5,170	1,171	1,260
Nickel	43	66.1	637	155	132
Silver	30	0.087	8.3	1.54	1
Zinc	43	60	454	163	169
Diesel Range Hydrocarbons	26	19	4,600	1,367	144
Endrin aldehyde	13	0.0051	0.041	0.024	0.0064
Motor Oil	12	21	15,000	4,018	144
Pentachlorophenol	19	1.79	2.76	2.28	0.017
Phenol	19	2.34	3.06	2.70	0.13
PCBs, Total	8	0.0159	1.6941	0.25	0.09
DDTs, Total	45	0.003	11.01	1.22	0.03
Chlordanes, Total	15	0.003	0.25	0.081	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.6 Boat Dock

Nonchannel Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Nonchannel Area. The Excavation and Offsite Disposal alternative would remove soil

containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Nonchannel Area of the Boat Dock are shown below. The following information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Nonchannel Area of the Boat Dock.

Minimum, Maximum, and Average Values for FFS COPCs — Boat Dock Nonchannel Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Lead	9	22.8	349	93	46.7
Zinc	9	53.9	872	257	161
Heptachlor epoxide	7	0.011	0.017	0.014	0.0088
Methoxychlor	9	0.023	0.62	0.32	0.09
PAHs Total	10	0.115	23.092	6.7	4.022
DDTs Total	10	0.0337	0.46	0.15	0.03
BHCs Total	9	0.34	0.34	0.34	0.0048
Chlordanes Total	7	0.0018	0.0195	0.009	0.00479

Units are in ppm

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

Channel Area

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the Channel Area. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the Channel Area of the Boat Dock are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for the Channel Area of the Boat Dock.

Minimum, Maximum, and Average Values for FFS COPCs — Boat Dock Channel Area

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Barium	11	60.3	1,060	158	188
Copper	11	74.3	348	105	88.7
Lead	11	26	1,980	206	46.7
Zinc	11	129	1,740	284	169

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.3.7 Area 14

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for Area 14. The Excavation and Offsite Disposal alternative would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at Area 14 are shown below. This information was considered in the process of selecting Alternative 2 and establishing excavation boundaries for Area 14.

Minimum, Maximum, and Average Values for FFS COPCs — Area 14

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Cobalt	14	3.7	93.3	21	26.7
Motor Oil	16	26	660	134	144
PAHs Total	14	0.004	35.207	3.18	4.022
DDTs Total	14	0.0049	0.35	0.10	0.03

Units are in ppm.

Alternative 1, No Further Action, was not selected because this alternative would not meet RAOs.

3.4.3.8 Former Sewage Treatment Plant Outfall and Pipe

Alternative 2, Excavation and Offsite Disposal, is the preferred alternative for the FSTP Outfall and Pipe. Alternative 2 would remove soil containing FFS COPCs at concentrations above action goals. The excavated area would be backfilled with clean onsite soil or re-handled dredged material with physical characteristics similar to the soil removed from the coastal salt marsh. The alternative would meet RAOs by removing FFS COPCs above action goals.

The FSTP pipeline may contain residual COCs, so it is being removed as part of this action. The wooden pipeline support structure will not be removed. The pipeline will be disposed of at an appropriate facility.

The area recommended for excavation is shown on Figure 3.4-1. Excavation boundaries were established to address soil containing FFS COPCs at concentrations above action goals. A summary of the minimum, maximum, and average values for FFS COPCs remaining at the FSTP Outfall and Pipe are shown below. This information was considered in the process to select Alternative 2 and establish excavation boundaries for the FSTP Outfall and Pipe.

Minimum, Maximum, and Average Values for FFS COPCs — Former Sewage Treatment Plant Outfall

COPC	Number of Samples	Minimum Value	Maximum Value	Average Value	Action Goal
Copper	12	41.2	159	84	88.7
Lead	12	10.4	171	46	46.7
Mercury	12	0.25	8.4	1.68	0.58
Silver	12	0.2	23.2	6.8	1
Zinc	12	61.7	255	145	169
DDTs Total	4	0.063	0.063	0.063	0.03
Chlordanes Total	4	0.0055	0.0055	0.006	0.00479

Units are in ppm.

Alternative 1, No Further Action, was not selected because it would not meet RAOs.

3.4.4 Estimated Excavation Volume/Area and Impact on Coastal Salt Marsh Habitat

Alternative 2, Excavation and Offsite Disposal, was selected for all of the coastal salt marsh sites. Implementation of this alternative is expected to result in excavation of a total of 30,165 cubic yards of soil/sediment. The total short-term impact to the salt marsh habitat from excavation activities and equipment access is estimated to be 5.81 acres. Significant short-term impacts, including damage and destruction of habitat, will occur as a result of remediation activities at each coastal salt marsh site. It is expected that the habitat will fully reestablish itself naturally within 2 years. Specific monitoring procedures for habitat recovery will be developed in conjunction with the appropriate state and federal agencies during the remedial design process. Alternative 2 is not expected to have a long-term impact on the habitat in the coastal salt marsh, except at the Historic ODD and ODD, where the margins of the ditches may be excavated and removed. The long-term impact at these sites is expected to affect 0.26 acres.

A total of approximately 6.07 acres of coastal salt marsh habitat is expected to be temporarily or permanently affected by remediation activities. The actual number of acres impacted at a specific site may vary when field activities are conducted. The final footprint of excavation activities will be determined as part of the remedial design and/or confirmation sampling conducted during remedial activities.

TABLE 3.4-1
Comparative Analysis Summary

Site	Alternative	Evaluation Criteria Rankings: Overall Protection of Human Health and the Environment	Compliance with State and Federal Requirements	Long-Term Effectiveness and Permanence	Reduction of TMV Through Treatment	Cost	Short-Term Effectiveness	Implementability	Regulatory Agency Acceptance	Community Acceptance
Alternative Disposal Area	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$248,500	Medium	Medium	High	TBD
East Levee Construction Debris Disposal Area	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$942,000	Medium	Medium	High	TBD
High Marsh Area Proposed FWEP Channel Cut	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$520,700	High	High	High	TBD
High Marsh Area Non Channel Cut	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$1,334,000	High	High	High	TBD
Historic Outfall Drainage Ditch	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$138,000	Medium	Medium	High	TBD
Outfall Drainage Ditch	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$266,000	Medium	Medium	High	TBD
Area 14	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$73,200	Medium	Medium	High	TBD
FSTP Outfall and Pipe	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$225,000	Medium	Medium	High	TBD
	1	NA	NA	NA	NA	NA	High	High	Low	TBD
	2	High	High	High	High	$217,300	Medium	Medium	High	TBD

NA = not applicable
TBD = to be determined

Alternative 1—No Further Action
Alternative 2—Excavation and Offsite Disposal

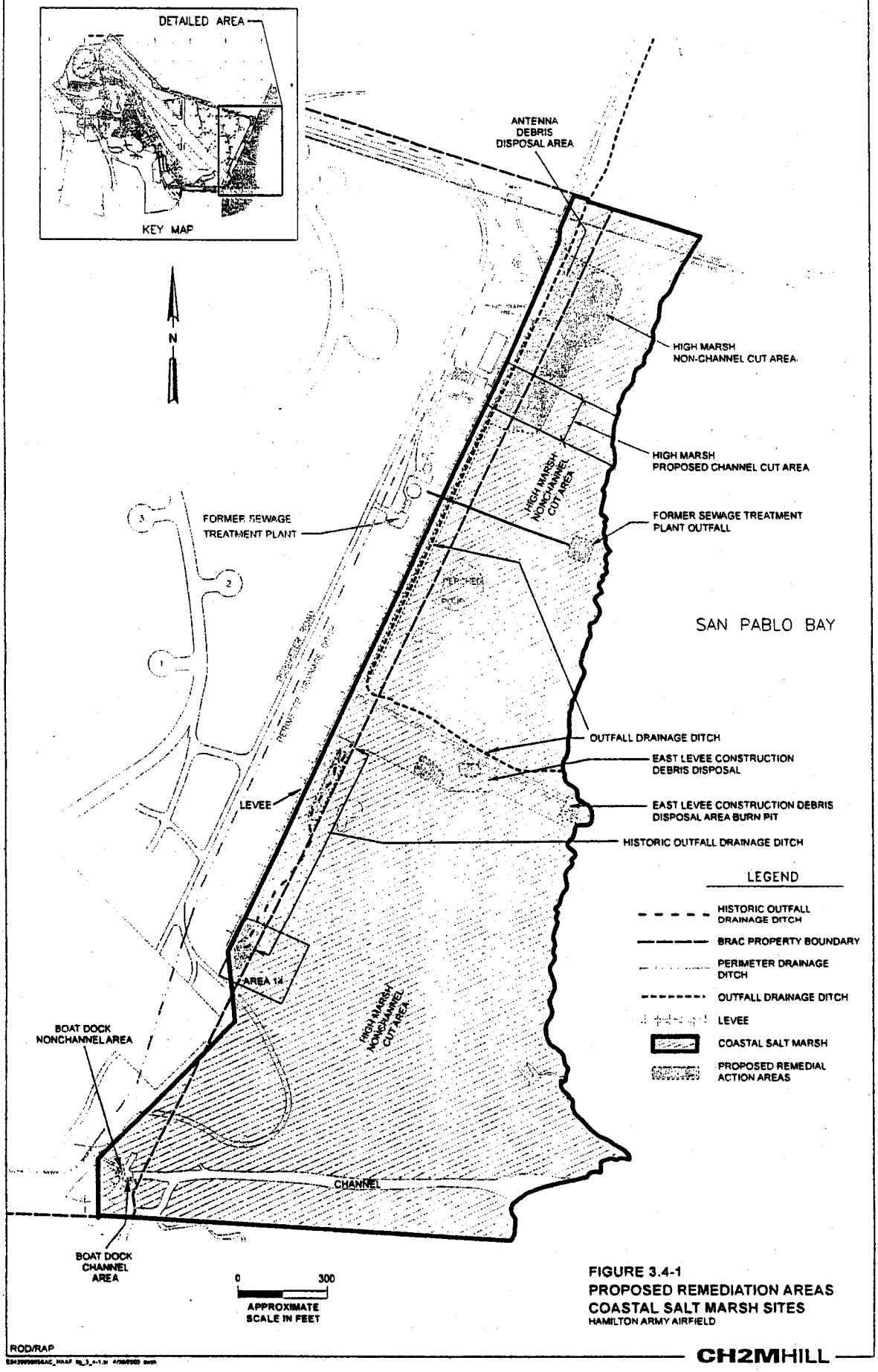

FIGURE 3.4-1
PROPOSED REMEDIATION AREAS
COASTAL SALT MARSH SITES
HAMILTON ARMY AIRFIELD

ROD/RAP

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